

**Summary Minutes of the  
U.S. Environmental Protection Agency (EPA)  
Science Advisory Board (SAB)  
Panel for the Review of Hydraulic Fracturing Study Plan  
Public Teleconference  
May 19, 2011**

Date and Time: Thursday, May 19, 2011, 1:00 P.M. – 5:00 P.M.

Location: Teleconference Only

Purpose: The purpose of the teleconference call was for the Panel to discuss substantive comments from Panel members on the draft SAB report *Review of EPA's Draft Hydraulic Fracturing Study Plan*.

Participants:

SAB Panel: Panel for the Review of draft Hydraulic Fracturing Study Plan (See Roster, Attachment A)

Dr. David A. Dzombak, Chair  
Dr. George Alexeeff  
Dr Tom Ballestero  
Dr. Mark Benjamin  
Dr. Michel Boufadel  
Dr. Elizabeth Boyer  
Mr. David Burnett  
Dr. Thomas L. Davis  
Dr. Shari Dunn-Norman  
Dr. John P. Giesy  
Dr. Jeffrey Griffiths  
Dr. Phillip Gschwend  
Dr. Cynthia M. Harris  
Dr. Nancy K. Kim  
Dr. Cindy M. Lee  
Dr. Duncan Patten  
Dr. Stephen Randtke  
Dr. Danny Reible  
Dr. Connie Schreppel  
Dr. Geoffery Thyne  
Dr. Jeanne VanBriesen  
Dr. Radisav Vidic

Mr. David Burnett, Dr. Tom Ballestero, Dr. John P. Giesy, and Dr. Duncan Patten could not participate at the teleconference but provided written comments in preparation for the teleconference call.

EPA SAB Staff: Mr. Edward Hanlon, Designated Federal Officer

EPA Staff: Dr. Jeanne Briskin, EPA Office of Research and Development

Other Attendees: A list of members of the public who requested information for calling into the teleconference or who indicated they were on the teleconference is provided in Attachment B, Public Attendance.

Materials Available: The agenda and teleconference materials were circulated to the Panel in advance of the teleconference. These materials were made available to the public via the SAB Web site ([www.epa.gov/sab](http://www.epa.gov/sab)). The teleconference materials are available on the following SAB Hydraulic Fracturing (HF) May 19, 2011 teleconference website: <http://yosemite.epa.gov/sab/sabproduct.nsf/a84bfee16cc358ad85256ccd006b0b4b/3eaecfd0b27c12d285257869006807ad!OpenDocument&Date=2011-05-19>.

### **Meeting Summary**

The meeting was announced in the Federal Register<sup>1</sup> and proceeded according to the meeting agenda<sup>2</sup>. A summary of the meeting follows.

### **May 19, 2011**

#### **Opening Statements and Welcome**

Mr. Ed Hanlon, the Designated Federal Officer (DFO), opened the teleconference, and made a brief opening statement noting that the HF Study Plan Review Panel is a Federal Advisory Committee under the Federal Advisory Committee Act (FACA). He noted the teleconference was open to the public and that one member of the public had requested to present an oral statement during the teleconference as noted in the list of public speakers<sup>3</sup>, and that several sets of written comments were received from the public and were posted onto the teleconference website. Mr. Hanlon also noted minutes of the meeting were being taken to summarize discussions and action items in accordance with requirements under FACA. He then turned the teleconference call over to the Chair, Dr. David Dzombak.

Dr. Dzombak welcomed everyone and noted this is an Advisory effort where a report seeking consensus would be prepared. He reviewed the agenda for the meeting and noted that Panel member preliminary comments to SAB's 4/28/11 draft report were posted on SAB's teleconference website. He then introduced Dr. Jeanne Briskin of EPA's Office of Research and Development (ORD) for her remarks.

#### **EPA Remarks**

Dr. Jeanne Briskin of EPA ORD noted that EPA's proposed study is very important, and that EPA had initiated a stakeholder process involving discussions with the public. She indicated that ORD believed it could accomplish work proposed within the draft HF Study Plan within EPA's

schedule and project budget. She also noted that ORD did not plan to conduct animal studies or an analysis of Best Management Practices (BMPs) as part of its HF research activities.

### **Public Comment**

Mr. Alan Roberson of the American Water Works Association (AWWA) noted that AWWA is concerned about drinking water. He referred to his electronic presentation that was posted on the teleconference website<sup>4</sup>, and stated that in western Pennsylvania, increased bromide levels were being found in drinking water sources. He indicated that utilities were also finding increased brominated by-products in finished drinking waters. He referred to his previous oral comments that were presented at the March 7, 2011 SAB public meeting on the review of EPA's draft HF Study Plan.

Dr. Dzombak thanked Mr. Roberson for his comments and asked the Panel if they had any questions for Mr. Roberson. The Panel did not ask any questions.

Dr. Dzombak then commenced discussion on the draft SAB report, in order of the draft responses to each charge question. He stated that lead writers should outline SAB's proposed responses to the charge questions as indicated in the draft SAB report. He also noted that the draft report included a number of statements on the limited available time to complete ORD's research activities. Dr. Dzombak pointed out that Dr. Briskin stated that ORD believes it can achieve the work outlined in the Study Plan within its budget and schedule.

To begin discussion on each response to the charge questions, the Panel's lead writers first provided an overview of the draft written SAB response. Panel discussion then occurred on that draft response.

### **Charge Question 1: Water Use in Hydraulic Fracturing**

Dr. Dzombak requested SAB Panel comments to this section of the draft SAB report. There was discussion on whether there was a clear yes or no answer that the Panel could provide to this charge question. Several members noted that EPA's proposed activities were acceptable but incomplete. Dr. Dzombak noted that the draft SAB response would be updated to include this point. Other members recommended that the draft report be revised to note that EPA would assess water mass balances and water flux.

The Panel also agreed to recommend addition of a separate component to Figure 7 of the draft Study Plan to address HF post closure activities and HF well abandonment. Several technical comments that addressed HF post closure/well abandonment issues were raised in preliminary comments submitted from several members. These comments were briefly discussed during the teleconference and it was agreed to consider incorporating these comments into the next draft of the revised draft SAB report.

### **Charge Question 2: Research Questions**

One member noted that the current draft text had some inconsistencies and redundancies, and Dr. Dzombak noted the report would be revised to address these concerns. Several members commented that ORD should assess BMPs as part of its HF research, and noted that BMPs were very important and that ORD should separate inherently dangerous HF practices and activities

from poor HF management practices. These members agreed to rewrite the discussion on BMPs to address comments discussed on the teleconference.

Several members suggested that the SAB report be revised to be consistent in distinguishing the well drilling and construction, HF, and post-closure and well abandonment phases of HF. There was agreement to revise the draft report to clearly distinguish SAB recommendations associated with these different phases of HF. The Panel agreed that EPA should identify whether there is anything different regarding the post closure/well abandonment phase of HF wells when compared to post closure/well abandonment phase for other types of wells.

Members also agreed that discussions on Environmental Justice issues within Section 3.2.1. of the report should be clarified and EPA should note how Environmental Justice issues would be incorporated into the research and whether and how Environmental Justice would be assessed in the case studies. The Panel also suggested that EPA clarify the intended outcomes for Environmental Justice.

### **Charge Question 3: Research Approach**

The Panel agreed that in general, the draft text adequately captured discussions at the March 7-8 SAB meeting, and noted that EPA should provide additional detail regarding the necessary tools to assess potential impacts. The Panel also agreed to move three paragraphs from the draft text to the discussion under Charge Question 2.

### **Charge Question 4(a): Proposed Research Activities - Water Acquisition**

The Panel discussed EPA's definition of drinking water resources as noted in the draft Study Plan, and agreed to reword the paragraph within SAB's draft report that referred to EPA's definition of drinking water resources (i.e., waters with total dissolved solids (TDS) less than 10,000 parts per million). The Panel noted that many waters throughout the U.S. are highly saline, and potential HF impacts to those waters should not be excluded from analysis. The Panel agreed that the paragraph should be reworded to emphasize that EPA should not automatically exclude from consideration potential impacts on a water source having more than 10,000 mg/L of total dissolved solids if it could reasonably be anticipated to be a viable source of water supply in the future.

The Panel also agreed to reword and bolster discussions on the SAB's concerns regarding EPA research activities associated with assessing potential impacts associated with cumulative water withdrawals. One member agreed to redraft this discussion for inclusion within the next draft SAB report.

### **Charge Question 4(b): Proposed Research Activities - Chemical Mixing**

The Panel generally agreed with the tone and direction of the draft SAB report response to this charge question. The Panel agreed to clarify the concerns SAB was raising regarding data sources and references, and also agreed to revise the toxicity testing wording to more clearly state SAB's concerns with EPA's plan to conduct independent toxicity testing as part of the research plan.

### **Charge Question 4(c): Proposed Research Activities - Well Injection**

Several members agreed to revise the draft SAB report to note that EPA's proposed activities were too broad and should be narrowed so that EPA can adequately assess the research questions. The Panel also discussed the relative priority of assessing potential exposure to flowback and produced water, groundwater contaminated through HF operations, and HF waters that are disposed at Publicly Owned Treatment Works (POTWs). The Panel further agreed to refine its comments regarding the definition of flowback and produced waters to note how SAB differentiated these two types of HF waters.

Regarding natural occurring substances, the Panel agreed to revise the report to request that EPA clarify its definition of these substances and whether and how it plans to assess these substances with regard to HF activities. The Panel also agreed to clarify SAB's toxicity testing wording in a manner similar to the revisions that would be made on this topic under SAB's response to Charge Question 4(b).

One member agreed to revise and clarify the SAB draft response regarding its concerns associated with HF activities in fault zones and other highly stressed subsurface areas, and the SAB's recommendations for measurements and modeling scenarios on this topic.

#### **Charge Question 4(d): Proposed Research Activities - Flowback and Produced Water**

The Panel generally agreed with this section of the draft report. The Panel discussed and agreed to add an overarching comment that would recommend that EPA's Study Plan distinguish planned research activities associated with the different types of HF waters.

#### **Charge Question 4(e): Proposed Research Activities - Wastewater Treatment and Waste Disposal**

The Panel discussed whether to narrow or revise SAB's draft response related to HF wastewater treatment and disposal. The Panel generally agreed that SAB should recommend that EPA narrow and focus the research questions that should be answered under this topic, define current HF treatment options, identify what are the most important potential impacts and most reasonable treatment processes, and conduct literature searches to identify reasonable processes that could be utilized for the treatment and disposal of HF wastes. Members also agreed to revise the draft SAB report regarding its discussion and recommendations on land application of HF wastewaters and wastes and on HF wastewater treatment and disposal scenario modeling.

#### **Charge Question 5: Research Outcomes**

The Panel recommended that text be inserted at the beginning of SAB's response to this charge question to clarify how SAB approached its response on this topic. The Panel agreed to add a recommendation that Section 9 of EPA's draft Study Plan should specify the research activities that would occur. The Panel also agreed to revise its advice to clarify comments that focused on outcomes of each lifecycle stage identified by EPA in the draft Study Plan.

Several members commented that the Panel should revise the draft report's recommendations regarding EPA's proposed modeling efforts and the usefulness of modeling results. Several members agreed to make these revisions.

Dr. Dzombak discussed next steps and action items. He noted that the cover letter and executive summary of the draft SAB report would be discussed on the public teleconference to occur on May 25, 2011.

With the meeting business concluded, Designated Federal Officer Ed Hanlon adjourned the meeting at 5:00 pm ET.

Respectfully Submitted:

*/signed/*

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Mr. Edward Hanlon  
Designated Federal Officer

Certified as Accurate:

*/signed/*

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Dr. David A. Dzombak  
Chair  
EPA SAB Staff Office Panel for the  
Review of Hydraulic Fracturing  
Study Plan

**NOTE AND DISCLAIMER:** The minutes of this public teleconference reflect diverse ideas and suggestions offered by Panel members during the course of deliberations within the teleconference. Such ideas, suggestions and deliberations do not necessarily reflect consensus advice from the Panel members. The reader is cautioned to not rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters or reports prepared and transmitted to the EPA Administrator following the public meetings or teleconferences.

### **Materials Cited**

The following meeting materials are available on the SAB website: <http://www.epa.gov/sab>, at the May 19, 2011 teleconference website:  
<http://yosemite.epa.gov/sab/sabproduct.nsf/a84bfee16cc358ad85256ccd006b0b4b/3eaecfd0b27c12d285257869006807ad!OpenDocument&Date=2011-05-19>:

<sup>1</sup> Federal Register Notice Announcing the Teleconference

<sup>2</sup> Agenda for May 19, 2011 Public Teleconference

<sup>3</sup> List of Public Speakers

<sup>4</sup> Oral Statement from Alan Roberson, American Water Works Association (AWWA)

## **ATTACHMENT A – ROSTER**

### **U.S. Environmental Protection Agency Science Advisory Board Hydraulic Fracturing Study Plan Review Panel**

#### **CHAIR**

**Dr. David A. Dzombak**, Walter J. Blenko Sr. Professor of Environmental Engineering, Department of Civil and Environmental Engineering, College of Engineering, Carnegie Mellon University, Pittsburgh, PA

#### **MEMBERS**

**Dr. George Alexeeff**, Deputy Director for Scientific Affairs, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, Oakland, CA

**Dr Tom Ballestero**, Professor, Civil Engineering, University of New Hampshire, Durham, NH

**Dr. Mark Benjamin**, Professor, Department of Civil and Environmental Engineering, University of Washington, Seattle, WA

**Dr. Michel Boufadel**, Professor of Environmental Engineering, Civil and Environmental Engineering, College of Engineering, Temple University, Philadelphia, PA

**Dr. Elizabeth Boyer**, Associate Professor, School of Forest Resources and Assistant Director, Pennsylvania State Institutes of Energy & the Environment, and Director, Pennsylvania Water Resources Research Center, Pennsylvania State University, University Park, PA

**Mr. David Burnett**, Directory of Technology, GPRI, Department of Petroleum Engineering, Look College of Engineering, Texas A&M University, College Station, TX

**Dr. Thomas L. Davis**, Professor, Department of Geophysics, Colorado School of Mines, Golden, CO

**Dr. Shari Dunn-Norman**, Professor, Geological Sciences and Engineering, Missouri University of Science and Technology, Rolla, MO

**Dr. John P. Giesy**, Professor and Canada Research Chair, Veterinary Biomedical Sciences and Toxicology Centre, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

**Dr. Jeffrey Griffiths**, Associate Professor, Department of Public Health and Community Medicine, School of Medicine, Tufts University, Boston, MA

**Dr. Phillip Gschwend**, Professor, Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, MA

**Dr. Cynthia M. Harris**, Director and Professor, Institute of Public Health, Florida A&M University, Tallahassee, FL

**Dr. Nancy K. Kim**, Senior Executive, Health Research, Inc., Troy, NY

**Dr. Cindy M. Lee**, Professor, Department of Environmental Engineering and Earth Sciences, Clemson University, Anderson, SC

**Dr. Duncan Patten**, Research Professor, Hydroecology Research Program, Department of Land Resources and Environmental Sciences, Montana State University, Bozeman, MT

**Dr. Stephen Randtke**, Professor, Department of Civil, Environmental, and Architectural Engineering, University of Kansas, Lawrence, KS

**Dr. Danny Reible**, Professor, Department of Civil, Architectural and Environmental Engineering, University of Texas, Austin, TX

**Dr. Connie Schreppel**, Director of Water Quality, Mohawk Valley Water Authority, Utica, NY

**Dr. Geoffery Thyne**, Sr. Research Scientist, Enhanced Oil Recovery Institute, University of Wyoming, University of Wyoming, Laramie, WY

**Dr. Jeanne VanBriesen**, Professor, Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA

**Dr. Radisav Vidic**, Professor and Chairman, Civil and Environmental Engineering, University of Pittsburgh, Pittsburgh, PA

#### **SCIENCE ADVISORY BOARD STAFF**

**Mr. Edward Hanlon**, Designated Federal Officer, U.S. Environmental Protection Agency, Washington, DC



## ATTACHMENT B – Other Attendees

### List of Members of the Public Who Requested Information for Calling into the Public Teleconference of the SAB Panel for the Review of Hydraulic Fracturing Study Plan, or Who Indicated They Were On the Teleconference

\*Denotes members of the public who indicated they were on the teleconference.

**May 19, 2011**

<b>Name</b>	<b>Affiliation</b>
Alexander, Bruce	Exelon Corporation
Armstrong, Matthew J.*	Bracewell & Giuliani LLP
Becker, Joshua L.	Alston & Bird, LLP
Bolich, Rick	North Carolina Department of Environment and Natural Resources
Bravender, Robin	Politico
Brownell, Mike	Chesapeake Energy Corporation
Browning, Andrew	HBW Resources LLC
Cappiello, Dina	The Associated Press
Casper, Andrew	Colorado Oil & Gas Association
Caughran, David*	McBee Strategic
Connors, Mark S.	Erie County Water Authority
Cooper, Nicole	Dallas City Hall
Davis, R. Jeffrey	Cardno ENTRIX
DeBard, Amanda	Potomac Research Group
Deeley, George*	Shell Upstream Americas
DiCosmo, Bridget	Inside EPA
Dolan, Donna M.	Environmental Standards, Inc.
Dzubin, Brian	Conoco Phillips Corporation
Eberhard, Mike*	Halliburton, Inc.
Ekstrom, Megan	Cassidy & Associates
Erraguntla, Neeraja	Texas Commission on Environmental Quality
Etengoff, Bracha	National Environmental Law Center
Evans, Scott B.	Millennium Management, LLC
Feingold, Jessica*	Wilmer, Cutler, Pickering, Hale, and Dorr, LLP
Fuller., Lee	Independent Petroleum Association of America (IPAA)
Gallo, Thomas F.	Emerald Development Managers
Gill, Clint	Conoco Phillips Corporation
Grady, Sarah	American Continental Group
Greenwalt, Denise	State of Pennsylvania Department of Environmental Protection
Greissing, Chris	Industrial Minerals Association - North America
Guith, Christopher	U.S. Chamber of Commerce
Handy, Alicia	Wilmer, Cutler, Pickering, Hale, and Dorr,

<b>Name</b>	<b>Affiliation</b>
	LLP
Horwitt, Dusty	Environmental Working Group (EWG)
Hufford, Walt	Talisman Energy USA, Inc.
Jester, Stephen L.	Conoco Phillips Corporation
Kane, Kimberlee*	New York City Department of Environmental Protection
Kaplowitz, Joshua	Katten, Muchin & Rosenman, LLP
Kurth, Thomas E. *	Haynes and Boone, LLP
Martin-McNaughton, Jamie	Potomac-Hudson Engineering, Inc.
Marty, Gabriel	Embassy of France for the United States
Maunder, Tom*	Alaska Oil and Gas Conservation Commission
Meadows, Stephanie R.*	American Petroleum Institute
Mendoza, Mary	Haynes and Boone, LLP
Miner, Michael	Drinker, Biddle, & Reath, LLP
Mize-Spansky, Kristine L.	Encana Corporation
Moldenhauer, Charles B.	Morgan, Lewis & Bockius, LLP
Murphy, Jim	National Wildlife Federation
Pagliocca, Rachel*	Golin Harris, Inc.
Passwaters, Mark*	SNL Energy
Plummer, Annika	Southwest Water Authority
Popeil, Jaclyn	Conoco Phillips Corporation
Power, Stephen	The Wall Street Journal
Rawleigh, Francesca	Marwood Group
Rawleigh, Francesca*	Marwood Group
Reamer, Christine	National Ground Water Association
Renninger, Kevin P. *	Environmental Standards. Inc.
Reyes, Charles*	Association of State and Territorial Solid Waste Management Officials (ASTSWMO)
Roberson, J. Alan*	American Water Works Association (AWWA)
Seitz, J. Barton	Baker, Botts LLP
Sinclair, Les	L48 Drilling & Completions
Tollefson, Jeff	Nature Magazine
Valade, Matthew	Hazen and Sawyer P.C.
Watson, James F.	Inflection Energy, LLC.
White, Rodney	Platts Gas Daily
Wilson, Laurie	RPS Group Plc
Wilson, Linda M.*	New York State Office of the Attorney General
Wright, Ben	Hazen and Sawyer, P.C.
Young, Sue	Delaware Riverkeeper Network